



YEAR 8 MATHEMATICS

WORK PROGRAM

Year 8 Level Description

In Year 8, students apply a variety of mathematical concepts in real-life, life-like and purely mathematical situations.

The proficiency strands *Understanding, Fluency, Problem Solving and Reasoning* are an integral part of mathematics content across the three content strands:

Number and Algebra, Measurement and Geometry, and Statistics and Probability.

The proficiencies reinforce the significance of working mathematically within the content and describe how the content is explored or developed. They provide the language to build in the developmental aspects of the learning of mathematics.

At the year 8 level:

Understanding includes describing patterns involving indices and recurring decimals, identifying commonalities between operations with algebra and arithmetic, connecting rules for linear relations their graphs, explaining the purpose of statistical measures, and explaining measurements of perimeter and area.

Fluency includes calculating accurately with simple decimals, indices and integers, recognising equivalence of common decimals and fractions including recurring decimals, factorising and simplifying basic algebraic expressions, and evaluating perimeters, areas of common shapes and their volumes and three dimensional objects.

Problem Solving includes formulating, and modelling practical situations involving ratios, profit and loss, areas and perimeters of common shapes, and using two-way tables and Venn diagrams to calculate probabilities.

Reasoning includes justifying the result of a calculation or estimation as reasonable, deriving probability from its complement, using congruence to deduce properties of triangles, finding estimates of means and proportions of populations.

ICT Statement

Throughout Year 8, students will require ready access to ICTs at a whole-class, small group and individual level. Such ICTs include spreadsheet software, graphing software, graphic calculators or mobile device apps.

Note: A mobile device is a portable computing device, typically having a display screen with touch input or a miniature keyboard.

Ensure that the use of ICT in the classroom, including mobile devices, complies with DET policy requirements – SCM-PR-003:

Appropriate use of mobile telephones and other electronic equipment by students (<http://ppr.det.qld.gov.au/education/learning/Pages/Appropriate-Use-of-Mobile-Telephones-and-other-Electronic-Equipment-by-Students.aspx>).

Year 8 Achievement Standard

By the end of Year 8:

Students solve everyday problems involving rates, ratios and percentages.

They recognise index laws and apply them to whole numbers.

They describe rational and irrational numbers.

Students solve problems involving profit and loss.

They make connections between expanding and factorising algebraic expressions.

Students solve problems relating to the volume of prisms.

They make sense of time duration in real applications.

They identify conditions for the congruence of triangles and deduce the properties of quadrilaterals.

Students model authentic situations with two-way tables and Venn diagrams.

They choose appropriate language to describe events and experiments.

They explain issues related to the collection of data and the effect of outliers on means and medians in that data.

Students use efficient mental and written strategies to carry out the four operations with integers.

They simplify a variety of algebraic expressions.

They solve linear equations and graph linear relationships on the Cartesian plane.

Students convert between units of measurement for area and volume.

They perform calculations to determine perimeter and area of parallelograms, rhombuses and kites.

They name the features of circles and calculate the areas and circumferences of circles.

Students determine complementary events and calculate the sum of probabilities.

General Capabilities and Cross-curriculum Priorities



Mathematics provides opportunities for students to strengthen their appreciation and understanding of Aboriginal peoples and Torres Strait Islander peoples and their living cultures. Specific content and skills within relevant sections of the curriculum can be drawn upon to encourage engagement with:

- Aboriginal and Torres Strait Islander frameworks of knowing and ways of learning
- Social, historical and cultural contexts associated with different uses of mathematical concepts in Australian Indigenous societies
- Aboriginal peoples' and Torres Strait Islander peoples' contributions to Australian society and cultures.

Mathematics provides opportunities to explore aspects of Australian Indigenous knowing in connection to, and with guidance from, the communities who own them. Using a respectful inquiry approach, students have the opportunity to explore mathematical concepts in Aboriginal and Torres Strait Islander lifestyles including knowledge of number, space, measurement and time. Through these experiences, students have opportunities to learn that

Aboriginal peoples and Torres Strait Islander peoples have sophisticated applications of mathematical concepts which may be applied in other peoples' ways of knowing.

Aboriginal and Torres Strait Islander histories and cultures

<https://8ways.wikispaces.com/8way+maths>

- Have a yarn-up about times when you've used maths to solve real problems in your life. Highlight the importance of yarnning as a way of creating and passing on knowledge in Aboriginal culture.
- Use pictorial graphs to make learning maps showing student progress and desired outcomes. Explain that visualising plans and pathways is an important part of Aboriginal culture.
- Do hands-on problem-solving activities and allow time for reflection. Explore unspoken values and ethical issues in content. Explain that learning without words by using your hands, thinking deeply and finding unspoken meanings are all central to Aboriginal culture.
- Use visuals and create symbols to help students understand and remember content. Promote this as an Aboriginal form of communication.
- If you have to measure something, why not measure natural objects from the local landscape? Highlight Aboriginal connection to Country.
- Apply mathematical knowledge to unrelated/unexpected domains and contexts. Set problems with multiple creative solutions. Celebrate this kind of creative and adaptive thinking as the reason for Aboriginal culture being the longest surviving culture on the planet.
- Model every activity for students, promoting an Aboriginal protocol of "Watch first, then do".
- Relate problems and maths applications back to community life wherever possible. Where a community equivalent does not exist for content you are teaching, discuss ways in which the new knowledge could be applied for community benefit. Create outlets and projects for students to teach/apply important mathematical knowledge to the community.

Asia and Australia's engagement with Asia

- Use Australia's business with Asia as a basis for work with finance and percentage.
- Investigate time zones in Asia when doing time units.
- Find distances on maps including Asia or Asian cities when studying scale factor.
- For units on data, use data on Asia as a secondary source for creating graphs and compiling statistics.

Sustainability

- For units on measurement: find perimeters and areas of sustainable garden plots, fish farming areas; find surface area and volume of mulch bins, rainwater storage tanks;
- For units on data, use data on sustainability as a secondary source for creating graphs and compiling statistics.

ASOT (DIMENSIONS)

<p>Curriculum intent What do my students need to learn? Curriculum is the planned learning that a school offers and enacts. Curriculum intent is what we want students to learn from the mandated curriculum. Teachers decide how best to plan and deliver the curriculum to ensure all students have opportunities to engage in meaningful learning.</p>	<p style="text-align: center;">Content descriptions</p> <p>This work program provides opportunities for students to engage in the Australian Curriculum Content descriptions.</p> <p style="text-align: center;">General capabilities</p> <p>This work program provides opportunities for students to engage in the following General capabilities:</p> <p>Literacy</p> <p>Numeracy</p> <p>ICT Students will have opportunities to demonstrate the Australian Curriculum <i>ICT learning continuum</i> in: -Investigating with ICT -Managing and operating with ICT</p> <p>Critical and creative thinking -Analysing, synthesising and evaluating reasoning and procedures.</p> <p>Personal and social capability -Social awareness</p> <p style="text-align: center;">Relevant prior curriculum</p> <p>Students require prior experience with pre-requisite topics for each unit.</p>
<p>Feedback What do my students already know? What do my students need to learn? How do I teach it? Feedback is information and advice provided by a teacher, peer, parent or self about aspects of someone's performance. The aim of feedback is to improve learning and is used to plan what to teach next and how to teach it. Teachers and students use feedback to close the gap between where students are and where they aim to be. Teachers use self-feedback to guide and improve their teaching practice.</p>	<p style="text-align: center;">Supportive learning environment</p> <p>Differentiation What do your students already know and what do your students need to learn? Consider the individual needs of your students - including ESL, gifted and talented and students requiring additional support. Start where students are at and differentiate teaching and learning to support the learning needs of all students. Plan and document how you will cater for individual learning needs. The learning experiences within this unit can be differentiated by increasing: -the frequency of exposure for some students; -the intensity of teaching by adjusting the group size; -the duration needed to complete tasks and assessment. For guided and/or independent practice tasks: -student groupings will offer tasks with a range of complexities to cater for individual learning needs; -rotational groupings allow for more or less scaffolding of student learning.</p> <p>Feedback to students Establish active feedback partnerships between students, teachers and parents to find out: • what each student already knows and can do; • how each student is going;</p>

	<ul style="list-style-type: none"> • where each student needs to go next. <p>Ensure feedback is timely, ongoing, instructive and purposeful. Use feedback to inform future teaching and learning.</p> <p>Reflection on the unit plan Identify what worked well during and at the end of the unit for future planning. Reflection may include:</p> <ul style="list-style-type: none"> • activities that worked well and why; • activities that could be improved and how; • monitoring and assessment that worked well and why; • monitoring and assessment that could be improved and how; • common student misconceptions that need, or needed, to be clarified • differentiation and future student learning needs.
<p>Sequencing teaching and learning What do my students already know and can do? What do my students need to learn? How do I teach it?</p>	<p style="text-align: center;">Teaching strategies and learning experiences</p> <p>A suggested learning sequence is outlined for each unit. See the Unit Plans and C2Cs (Teaching Sequence and attached Lesson Plans). The relationship between what is taught and how it is taught is critical in maximising student learning. Start with what your students already know and set goals for the next steps for learning. Decide how to provide multiple opportunities for all students to explore and consolidate ideas, skills and concepts by considering how students learn best and by using a variety of teaching strategies.</p>
<p>Assessment What do my students understand and can do? How well do they know and do it? Assessment is the purposeful, systematic and ongoing collection of information as evidence for use in making judgments about student learning. Principals, teachers and students use assessment information to support improving student learning. Feedback from evaluation of assessment data helps to determine strengths and weaknesses in students' understanding.</p>	<p style="text-align: center;">Monitoring student learning</p> <p>Student learning should be monitored throughout the teaching and learning process to determine student progress and learning needs. Each lesson provides opportunities to gather evidence about how students are progressing and what they need to learn next. Specific monitoring opportunities in this unit may include:</p> <p>Observation Collect information about students' ability.</p> <p>Consultation Consult with students about their ability level.</p> <p style="text-align: center;">Assessing student learning</p> <p>A variety of assessment should be implemented, reflecting the Achievement Standards.</p> <p style="text-align: center;">Moderating Assessment</p> <p>Before the task, teachers discuss task-specific descriptors of the quality of student performance. Teachers individually mark all student responses, applying the shared understanding achieved through this calibration process. Teachers moderate samples to ensure consistency of judgments.</p>
<p>Making judgments How do I know how well my students have learned? Teachers and students use standards to judge the quality of learning based on the available evidence. The process of judging and evaluating the quality of performance and depth of learning is important to promoting learning. Teachers identify the task-specific assessable</p>	<p style="text-align: center;">Judging student learning</p> <p>The Achievement Standards should be reflected in the Guide to Making Judgements. The proficiency strands “Understanding and Fluency” and “Problem Solving and Reasoning” are evident in the Guides to Making Judgments.</p>

elements to make judgments against specified standards on evidence.

YEAR 8 COURSE SCOPE AND SEQUENCE

TERM	WEEKS	UNIT	OVERVIEW	ASSESSMENT
1	1-6	C2C UNIT 2 FRACTIONS, DECIMALS, AND PERCENTAGES C2C UNIT 1 PERCENTAGE	ACARA: Carry out the four operations with rational numbers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183) Investigate terminating and recurring decimals (ACMNA184) Investigate the concept of irrational numbers, including π (ACMNA186) Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187) Solve problems involving profit and loss, with and without digital technologies (ACMNA189) GOALS: Define and approximate percentages Convert between fractions and decimals Write fractions and decimals as percentages Write percentages as decimals and fractions Write one amount as a percentage of the other Find a percentage of an amount Increase or decrease by a percentage Apply percentage to finance-markup and discount Apply percentage to finance-percentage profit/loss	Test-In Class
	6-7	C2C UNIT 2 PROBABILITY	ACARA: Identify complementary events and use the sum of probabilities to solve problems (ACMSP204) Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'. (ACMSP205) Represent events in two-way tables and Venn diagrams and solve related problems (ACMSP292) GOALS: Define probability Find theoretical probabilities Construct and use Venn diagrams Construct and use two-way tables	Test-In Class
	8-9	C2C UNIT 1 INTEGERS	ACARA: Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183) GOALS: Define integers and add/subtract integers Multiply and divide integers Use the order of operations with integers Perform operations with rational integers	Test-In Class
	10	C2C 1 or 2 FRACTIONS, DECIMALS, AND PERCENTAGES OR PROBABILITY NUMERACY AND NAPLAN	Apply knowledge of fractions, decimals, percentages OR probability to practical situations Review numeracy/NAPLAN	Assignment

TERM	WEEKS	UNIT	OVERVIEW	ASSESSMENT
2	1-3	C2C UNIT 3 INDEX NOTATION	ACARA: Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182) GOALS: Establish index notation Establish the multiplication index laws Establish the division index law Establish the power or a power index law Solve problems involving index laws	Test-In Class
	3-5	C2C UNIT 3 ALGEBRAIC EXPRESSIONS	ACARA: Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190) Factorise algebraic expressions by identifying numerical factors (ACMNA191) Simplify algebraic expressions involving the four operations (ACMNA192) GOALS: Substitute into expressions Identify and collect like terms Multiply and divide algebraic terms Expand expressions using the distributive law Factorise algebraic expressions	
	6-9	C2C UNIT 4 PERIMETER AND AREA	ACARA:: Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195). Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites (ACMMG196) Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area (ACMMG197) GOALS: Find perimeters of parallelograms, triangles, kites, and trapeziums Calculate the circumference of circles Find areas of parallelograms, triangles, kites, trapeziums Calculate the area of circles Solve problems involving perimeter/circumference and area	Test-In Class And/Or Assignment
	10	NAPLAN AND NUMERACY	GOALS: Review numeracy/NAPLAN	

TERM	WEEKS	UNIT	OVERVIEW	ASSESSMENT
3	1-3	C2C UNIT 5 DATA REPRESENTATION AND INTERPRETATION	<p>ACARA: Investigate techniques for collecting data, including census, sampling and observation (ACMSP284) Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (ACMSP206) Explore the variation of means and proportions of random samples drawn from the same population (ACMSP293) Investigate the effect of individual data values , including outliers, on the mean and median (ACMSP207)</p> <p>GOALS: Collect data Calculate and interpret statistics Create and find statistics for ungrouped data Create and evaluate data displays Find statistics from grouped data</p>	Test-In Class
	4-7	C2C UNIT 6 RATE AND RATIO	<p>ACARA: Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)</p> <p>GOALS: Simplify ratios Find proportions including unit ratios and scale factor Create and interpret scale drawings Rates including speed Share an amount in a given ratio</p>	
	7-9	C2C UNIT 6 LINEAR GRAPHS	<p>ACARA: Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193)</p> <p>GOALS: Use linear relations to describe rates Interpret line graphs Graph and interpret straight lines Solve linear equations Find a rule for a line</p>	Test-In Class
	10	C2C UNIT 6 TIME	<p>ACARA: Solve problems involving duration, including using 12- and 24-hour time within a single time zone (ACMMG199)</p> <p>GOALS: Use and convert between 12 and 24 hour time Explore time zones</p>	Assignment

TERM	WEEKS	UNIT	OVERVIEW	ASSESSMENT
4	1-4	C2C UNIT 7 EQUATIONS	<p>ACARA: Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution (ACMNA194)</p> <p>GOALS: Review algebra-simplify and expand Write and substitute into equations Solve basic 1 and 2 step equations Solve 3 step and bracketed equations Solve equations with unknowns on both sides Solve problems using equations</p>	Test-In Class
	4-5	C2C UNIT 7 CONGRUENCY	<p>ACARA: Define congruence of plane shapes using transformations (ACMMG200) Develop the conditions for congruence of triangles (ACMMG201) Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202)</p> <p>GOALS: Identify and create congruent shapes Use congruency tests for triangles Relate congruent triangles to quadrilaterals</p>	Test-In Class And/or Assignment
	6-8	C2C UNIT 8 VOLUME	<p>ACARA: Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198)</p> <p>GOALS: Review area including circles Define volume and its measures including conversions Find volume and capacity of prisms Apply volume to practical situations</p>	
	9-10	NAPLAN AND NUMERACY	Review Numeracy/NAPLAN	Practice NAPLAN test

ACARA CONTENT DESCRIPTION	TERM 1	TERM 2	TERM 3	TERM 4
Number and place value Use index notation with numbers to establish the index laws with positive integral indices and the zero index (ACMNA182)				
Number and place value Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)				
Real numbers Investigate terminating and recurring decimals (ACMNA184) Investigate the concept of irrational numbers, including π (ACMNA186) Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187) Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)				
Real numbers Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)				
Money and financial mathematics Solve problems involving profit and loss, with and without digital technologies (ACMNA189)				
Patterns and algebra Extend and apply the distributive law to the expansion of algebraic expressions (ACMNA190) Factorise algebraic expressions by identifying numerical factors (ACMNA191) Simplify algebraic expressions involving the four operations (ACMNA192)				
Linear and non-linear relationships Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193)				
Linear and non-linear relationships Solve linear equations using algebraic and graphical techniques. Verify solutions by substitution (ACMNA194)				
Using units of measurement Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195). Find perimeters and areas of parallelograms, trapeziums, rhombuses and kites (ACMMG196) Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area (ACMMG197)				
Using units of measurement Develop the formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198)				
Using units of measurement Solve problems involving duration, including using 12- and 24-hour time within a single time zone (ACMMG199)				
Geometric reasoning Define congruence of plane shapes using transformations (ACMMG200) Develop the conditions for congruence of triangles (ACMMG201) Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202)				
Chance Identify complementary events and use the sum of probabilities to solve problems (ACMSP204) Describe events using language of 'at least', exclusive 'or' (A or B but not both), inclusive 'or' (A or B or both) and 'and'. (ACMSP205) Represent events in two-way tables and Venn diagrams and solve related problems (ACMSP292)				
Data representation and interpretation Investigate techniques for collecting data, including census, sampling and observation (ACMSP284) Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (ACMSP206) Explore the variation of means and proportions of random samples drawn from the same population (ACMSP293) Investigate the effect of individual data values, including outliers, on the mean and median (ACMSP207)				